

A SYNOPSIS OF THE NEW WORLD SPECIES OF  
VERMILEO (DIPTERA-RHAGIONIDAE).

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It is not the writer's intention to present a complete revision of the New World species of *Vermileo* at this time. However, a certain amount of interesting information and material has been made available, and the writer feels that a summary of our present knowledge of this genus may be of value to future workers.

The genus *Vermileo* was established by Macquart in 1834 to include a single European species *V. degeerii* Macq. This species is the same as Linnaeus' *Musca vermileo*. The correct name of the genotype is then *Vermileo vermileo* (L.). *Vermileo* may be briefly characterized as small flies with an elongate abdomen with the intersegmental membranes well developed so that the segments are distinctly separated; third segment of the antennae somewhat acuminate and bearing a slender, indistinctly three-segmented arista which is as long or slightly longer than the rest of the antenna; legs slender, the posterior pair about twice as long as the other two pairs; tibial spurs 1:2:2; wings long and narrow, almost petiolate at base, anal cell narrow, no posterior lobe present, the fourth posterior and anal cells narrowed or closed at the border, anal vein somewhat sinuous near the base.

Most of the New World species now placed in *Vermileo* have led a rather checkered existence in the field of nomenclature. Walker (1851, p. 155) erected the genus *Pheneus* in which he placed the single species *tibialis* from Jamaica. Walker placed *Pheneus tibialis* with the Asilids next to the genus *Leptogaster* to which it had a superficial resemblance. All later workers have considered *Pheneus* a Rhagionid. Walker's species was known only from the type until Wheeler (1934, p. 236) secured a somewhat damaged specimen from Jamaica.

Williston (1895, p. 108) described the second species from Xucumanatlan, Mexico, placing it in a new genus *Arthrostylum* and calling his species *A. fascipennis*. Williston later (1900, p. 264) decided his species was the same as Walker's *Pheneus tibialis*; Wheeler (1931, p. 168) using Williston's description as a basis decided that *fascipennis* was distinct from *tibialis*.

Coquillett (1904, p. 21) described a *Pheneus opacus* from Ormsby County, Nevada. Wheeler (1918, p. 83), not recognizing Coquillett's species as a *Vermileo*, described as new *Vermileo comstocki* from Alta Meadow, California. Leonard (1930, p. 73)

showed that *Pheneus opacus* was a true *Vermileo*, but regarded it as distinct from *V. comstocki*. Wheeler (1930, p. 176), however, was inclined to the belief that his species was a variety or possibly a synonym of *opacus*, but said that more specimens of *opacus* would be necessary to determine this. Since in addition to the type male of *opacus* from Nevada, only two other specimens were known, both males from New Mexico, Wheeler's position was understandable. The writer, however, has secured one female and nine males of *opacus* from two localities. Part of this material has been compared with the type of *Pheneus opacus* and pronounced the same. After comparison with specimens of *V. comstocki*, including topotypic material, the writer has found characters which in his opinion show the distinctness of *opacus* and *comstocki*. The differentiating characters of the two species are included in the descriptive key.

Finally Wheeler (1931, p. 167) described *Vermileo tibialis* (Walker) var. *dowi* from Cuba. However, on the receipt of the specimen of *V. tibialis* from Jamaica mentioned above, Wheeler decided that *dowi* was probably subspecifically distinct. The writer is inclined to regard them as distinct species.

The nomenclatorial tangle was further complicated by a statement of Wheeler's in his description of *dowi* (1931, p. 168) that the hind tibiae had but one spur. This character along with the closed fourth posterior cell would be, in the writer's opinion, sufficient reason to regard the genus *Pheneus* as distinct from *Vermileo*. Walker does not mention the presence of tibial spurs in his description of *tibialis* and his figure shows two spurs on all the tibiae. Walker's figure was undoubtedly inaccurate, but it was also difficult to reconcile Wheeler's and Williston's descriptions as Williston had mentioned two spurs on the hind tibiae in *fascipennis*. However, an examination of specimens of *dowi* from Wheeler's original series shows the presence of two spurs on the hind tibiae instead of one; Mr. Oldroyd informs me that the tibial spur formula of the type of *fascipennis* corresponds with Williston's description. No specimens of *tibialis* still in possession of their hind legs are known, but doubtless two tibial spurs are present. Since the variable character of a closed fourth posterior cell is insufficient for the retention of the genus *Pheneus*, it must, on present evidence at least, be considered a synonym of the older name *Vermileo*, and the tibial spur formula may be written as 1:2:2 with a fair degree of assurance.

We have then in the New World five described species of *Vermileo* which are chronologically arranged below.

1851. *Vermileo tibialis* (Walker). [*Pheneus tibialis* Walk.] Type male from Jamaica; a female from Jamaica determined by Brunetti in the British Museum; a male from Jacksontown, Jamaica, determined by Wheeler in the Museum of Comparative Zoology at Harvard. Type in British Museum.
1895. *Vermileo fascipennis* (Williston). [*Arthrostylum fascipennis* Will.] Type male from Xucumanatlan, Guerrero, Mexico; one male and one female from Omilteme, Guerrero, Mexico, in British Museum. Type in British Museum.
1904. *Vermileo opacus* (Coquillett). [*Pheneus opacus* Coqu.] Type male from Ormsby Co., Nevada; known also from New Mexico, Utah, and California. Type in U. S. National Museum.
1918. *Vermileo comstocki* Wheeler. Type male from Alta Meadow, near Sequoia Giant Forest, California; known from both sexes. Type supposed to be in the Museum of Comparative Zoology at Harvard.
1931. *Vermileo dowi* Wheeler. [*Vermileo tibialis* (Walk.) var. *dowi* Wheeler.] Type not designated in description; described from a male and female from Trinidad Mts., Cuba; known from Mayari and San José, Trinidad Mts., and Soledad, Cuba. Type specimens in Museum of Comparative Zoology at Harvard.

The extremely interesting larval habits of *Vermileo comstocki* are described in detail by Wheeler (1930, Chap. 5); he also gives notes on the habits of *dowi* (1930, p. 275; 1931, p. 166). The habits of the remaining three species are unknown, but doubtless resemble those of *comstocki* and *dowi*. Larvae of *Vermileo* were collected by Dr. Donald DeLeon at Zion Canyon National Park, Utah; three adult males of *V. opacus* were reared from this material by Dr. O. A. Johannsen. Further information on the larval habits of *V. opacus* is not available at present.\*

#### DESCRIPTIVE KEY TO THE NEW WORLD SPECIES OF VERMILEO.

1. Wings without dark markings; fourth posterior cell usually open although sometimes much narrowed at margin . . . 2

\* Dr. DeLeon informs me that he is publishing on the distribution and larval habits of *Vermileo* in southwestern United States and describing a new species from Mexico.

- Wings with dark markings; fourth posterior cell usually closed.  
 ..... 3
2. Ground color of mesonotum and scutellum dull grayish brown; the three thoracic stripes are a dull brown, the middle one split by a grayish band which is usually as wide as either half of the stripe; wings with a brownish tinge. (Calif.).  
*ant. brown at base by dorsal vein.* *comstocki* Wheeler. written by W<sup>3</sup>.
- Ground color of mesonotum and scutellum yellowish brown becoming very pale in region of humeri; the three thoracic stripes are a shining brown, the middle one split by a fine yellowish line which sometimes may be almost invisible; wings practically hyaline (Calif., Nevada, Utah, New Mex.) *ant. brown 1/2 to 1/2 of dorsal vein.* *opacus* (Coqu.)
3. Face bare; apical spot becomes somewhat paler at extreme tip of wing (Mexico) ..... *fascipennis* (Will.)
- Face densely white pollinose; apical spot of uniform density.  
 ..... 4
4. First antennal segment about one and one half times as long as broad; posterior half of abdominal tergites not infuscated but first tergite bearing antero-dorsally a black transverse band; cross-band of wing narrow and somewhat irregular (Jamaica) ..... *tibialis* (Walk.)
- First antennal segment more than one and one half times as long as broad; posterior half of abdominal tergites brownish; first tergite without a transverse band; cross-band of wing broader and with relatively straight margins (Cuba) ..... *dowi* Wheeler.

*Vermileo opacus* (Coqu.).

This species has been known only from the type male collected in Ormsby Co., Nevada, and two males from Alamogordo, New Mexico. The writer has had the opportunity of examining three males from Zion Canyon National Park, Utah (D. DeLeon) and six males and one female from Arroyo Seco, Pasadena, California (F. E. Lutz). Leonard (1930, p. 72) gives an excellent redescription of the type male and there is no object in repeating it at this time. The female, however, has not been previously described.

Female.—Length 5.5 mm. *Head*: Face and front light brown pollinose; sides of face parallel; sides of front divergent so that front is twice as wide at vertex as at antennae; width of front at antennae very slightly wider than in male; occiput brownish pollinose with scattered golden hairs; palpi and proboscis pale brownish yellow; first two segments of antennae yellow, third segment and arista brown; first segment

half again as long as second, third slightly longer than second; arista slightly longer than remainder of antennae.

*Thorax*: Mesonotum dull yellowish brown pollinose, paler in region of humeri and with three somewhat shining brown stripes, the two lateral ones ending before the humeri; the median stripe divided by a faint narrow line; the scutellum light brown; the pleura brown with a white pollinose stripe above the coxae; halteres dark brown shading to yellowish near the base of the stalk; metanotum brown, sparingly white pollinose. Legs: coxae pale yellow, front pair with long white hairs near the apex; trochanters yellow; front and middle femora brownish yellow; hind femora darker yellow shading to brown at apex, about twice as long as middle and hind pairs and somewhat clavate; tibiae and tarsi matching in color their respective femora, apical tarsal segments being somewhat darker. Wings: membrane faintly but uniformly tinged with pale brownish; fourth posterior cell very much narrowed at margin; anal cell open.

*Abdomen*: Elongate, but less slender than in male; shining dark brown with yellow margins at base of all segments except the sixth; yellow margin of first segment broad, others narrower than in male.

Arroyo Seco, Pasadena, California, June 19, 1931, F. E. Lutz. Associated with males of same species collected on same date.

The writer wishes to acknowledge the kind assistance of Dr. C. H. Curran from whom specimens of *V. opacus* were obtained, Mr. C. T. Greene who compared specimens of *V. opacus* with the type, Mr. G. B. Fairchild from whom specimens of several species of *Vermileo* were secured, and Mr. H. Oldroyd who sent notes on specimens in the British Museum including the Walker and Williston types.

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## COURTSHIP AND COPULATION IN BROCHYMENA SULCATA VAN D.

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During the summer of 1937 the pentatomid, *Brochymena sulcata* Van D. appeared in great abundance in the vicinity of Las Cruces New Mexico. The insect was found on the trunks of apples, honey locust (*Gleditsia triacanthos* L.) and red mulberry (*Morus rubra* L.). Hundreds of individuals were observed on the last two hosts, trees that line the roadway through the grounds of the State College at Mesilla Park. The latter part of August appears to be the mating season for this species, for on the 28th of that month the following notes were made concerning the courtship and copulation.

Mating apparently goes on during the morning and afternoon; no pairs in copulation were observed during the late evening nor could any be found, with the aid of a spot light, after dark. Prior to the actual copulation the males showed a peculiar behavior toward the females. Females remain relatively passive during this time while the males run hurriedly up and down the tree trunks; while so doing they invariably keep up a noticeable beating of their antennae, moving them rhythmically in various directions. Frequently, as a male comes in contact with a female's body he strokes it with his antennae, seemingly to determine whether or not she is prepared to consummate the mating.

The male mounts on the female's back in the orthodox manner; then a most remarkable act occurs. The genital cup of the male is so constructed that the claspers and penis open from the upper surface of the segment. The male finds it necessary to rotate this cup